Memorandum of Understanding
between the
Landsat 7 Processing System (LPS)
and the
Landsat 7 Mission Operations Center (MOC)

June 1997

Review:

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1.0 Purpose

The purpose of this Memorandum of Understanding (MOU) is to provide complete documentation of the interface between the Landsat 7 Processing System (LPS) and the Landsat 7 Mission Operations Center (MOC).

1.1 Reference Documents

1.   NASA GSFC/MO&DSD, Mission Operations Center (MOC) <u>Functional and Performance Specification (F&PS)</u>, TBD

2.   NASA GSFC/MO&DSD, <u>Landsat 7 Processing System (LPS) Functiional and Performance Specification (F&PS)</u>, 560-8FPS/0194, July 31, 19946

3.   NASA GSFC/MO&DSD, <u>Landsat 7 Processing System (LPS) System Design Specification (SDS)</u>, 560-8SDS/0194, February 28, 1994.

4.   <u>National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) Landsat 7 Detailed Mission Requirements,</u> May 1995.

5.   NASA GSFC/MO&DSD, <u>Mission Operations Concept Document for the Landsat 7 Ground System</u>. TBD

6.   NASA GSFC/MO&DSD, <u>Landsat 7 Mission Operations Center (MOC) to Landsat 7 Ground Station (LGS) Interface Control Document</u>, 511-4ICD/0296, April 1997.
6.   NASA GSFC/MO&DSD, <u>Landsat 7 Mission Operations Center (MOC) to Landsat 7 Ground Station (LGS) Interface Control Document</u>, 511-4ICD/0296, April 1997.

2.0 Interface Description

The LPS shall provide the MOC with a data capture summary on a per contact basis. In addition, the LPS shall notify the MOC of anomalous return link quality and accounting information which is detected during post-pass processing.   The MOC will provide Landsat 7 contact period schedules to the LPS prepass. The MOC will provide Landsat 7 contact period schedules to the LPS prepass.

2.1   LPS Responsibilities

The LPS shall be capable of receiving the Landsat 7 contact schedule from MOC using FTP transfer.
The LPS shall be capable of receiving the Landsat 7 contact schedule from MOC using FTP transfer.

There are between 5-6 data acquisition sessions at the EDC during a given day. Within five minutes of the completion of each capture session, the LPS operator shall notify the MOC operations personnel of the capture summary. This information includes:

Number of Bytes Captured
Data Capture Start Time
Data Capture Stop Time

Approximation of the Number of Scenes Captured

In addition, any anomalies experienced during data capture, such as: loss of connection with the LGS, or late data capture start or premature capture termination based on the contact schedule shall be reported to the MOC.

Note the data capture times are indicative of when the LPS begins to capture data to disk and when the LPS closes the captured data file. They are not necessarily the Acquisition of Signal (AOS) and Loss of Signal (LOS) which will be detected by the Landsat 7 Ground Station (LGS).

The LPS operators will schedule the post pass processing to Level 0R data at an appropriate time. During data processing, return link quality and accounting statistics will be gathered on a contact period basis. Upon the detection of data anomalies, the LPS operator shall notify the MOC of the quality and accounting information. If no anomalies are detected, then no statistics will be reported to the MOC.

Return Link Quality and Accounting information to be passed to the MOC upon anomalous conditions includes:

LPS String Identifier
Contact Period Start and Stop Times
CADU Synchronization information (polarity, synchronization strategy and bit slips)
Count of CADUs with synchronization errors
Count of received CADUs
Count of flywheel CADUs
Count of missing CADUs
Count of correctable VCDU headers, by VCDU-ID
Count of uncorrectable VCDU headers
Count of CADUs with BCH errors corrected for the mission data zone in the VCDU
Count of CADUs with BCH errors uncorrected for the mission data zone in the VCDU
Count of CADUs with Cyclic Redundancy Check (CRC) errors
Approximate amount of wideband data received in megabytes
Approximation of number of major frames received
Approximate number of ETM+ scenes received
Approximate Bit Error Rate (BER) based on BCH detected and/or CRC bit errors

The LPS shall initiate contact with the MOC whenever any of the CADU/raw data related quality parameters exceeds a predetermined threshold, thus deemed anomalous. This threshold will be established and modified during operations as deemed necessary.

2.2   MOC Responsibilities

The MOC produces the Landsat 7 contact schedule daily and delivers it to the LPS before the first contact listed in the schedule. The contact schedule covers a 48-hour period. A revised contact schedule is sent whenever an unexpected schedule change occurs.

The MOC shall be capable of receiving the information described in section 2.12.

In addition, the MOC shall receive LPS generated metadata from the EOS Core System (ECS) which contains the return link quality and accounting information, and level 0R quality and accounting information for each subinterval, as well as cloud cover information for each scene. These metadata formats are documented in the LPS Data Format Control Document and the interface to the ECS is documented in the ECS-Landsat 7 ICD and is not covered further in this MOU. The MOC will utilize the metadata information for inputs to the image scheduling.

3.0 Interface Medium

The mechanism for the MOC-LPS interface is Voice or FAX, preferably Voice.   There is an electronic interface for the contact schedules. The MOC uses the FTP to transfer the contact schedules from the MOC to the LPS. The MOC employs the FTP put command to place the files in a designated directory on an LPS computer. If the files cannot be transferred, the FOT notifies the LPS personnel by telephone.

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4.0 Operational Procedures

The following sections discuss the operational procedures associated with this interface.

4.1 Nominal Data Summary Reporting

During the capture of data, the LGS, LPS, and MOC operations will be in voice contact. At the culmination of the acquisition session, the LPS operator will report the capture statistics to the MOC. These statistics will be displayed to the operator periodically during the capture session and a summary will be generated at the end of the session. Under nominal circumstances, this will be the only LPS statistics necessary to support the LPS-MOC interface. Post pass return link quality and accounting information will only be reported in anomalous conditions as described in section 4.2.

4.2 Anomaly Handling

Upon detection of anomalous return link quality and accounting information, the LPS operator will notify the MOC operator of the problem. An anomalous condition is whenever any of the CADU/raw data related quality parameters exceeds a predetermined threshold, thus deemed anomalous. This threshold will need to be determined and updated during the mission life.

4.3 Contact Schedules

The interface between the MOC and LPS with respect to the contact schedules will be parallel to that between the MOC and the LGS. See the MOC-LGS ICD (Reference Document 1.1.6) sections 3.2.2, 4.2.2, 5.2, and Appendix B for further details including the file format.
4.3 Contact Schedules

The interface between the MOC and LPS with respect to the contact schedules will be parallel to that between the MOC and the LGS except that the LGS is on the closed side and the LPS is on the open side. See the MOC-LGS ICD (Reference Document 1.1.6) sections 3.2.2, 4.2.2, 5.2, and Appendix B for further details including the file format.

The contact schedule file will have the naming convention L7yyyydddLPSSCH.Snn

where L7   is the mission ID

yyyy   is the year for which the schedule applies

ddd   is the first day of the interval for which the schedule applies (001-366)

LPSSCH   indicates that the file contains the contact schedule for the LPS

S   specifies the sequence number follows

nn   is the sequence number of the file for the year and day of year (00-99)